



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/613,196

07/07/2003

Jung-Hwan Kim

1349.1228

4578

21171

7590

03/24/2005

STAAS & HALSEY LLP

SUITE 700

1201 NEW YORK AVENUE, N.W.

WASHINGTON, DC 20005

EXAMINER

LIANG, LEONARD S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/613,196

Applicant(s)

KIM, JUNG-HWAN

Examiner

Leonard S. Liang

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 11-13, 15 and 19-28 is/are rejected.
- 7) ☒ Claim(s) 5-10, 14 and 16-18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 20-27 is rejected under 35 U.S.C. 102(b) as being anticipated by Olson (US Pat 5838338).

Olson discloses:

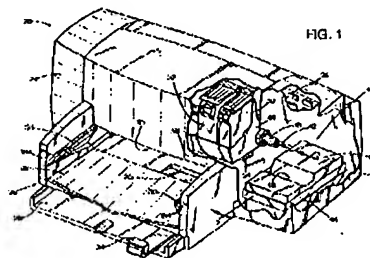
- {claim 20} A method of adjusting a head gap in an inkjet printer (abstract; column 5, lines 53-61); receiving a head gap adjustment command from a control unit; reading out a head gap state stored in a non-volatile memory of the control unit; comparing a head gap position to be adjusted according to the received head gap adjustment command to the head gap state read out from the non-volatile memory; adjusting the head gap position when the head gap position to be adjusted does not match the read-out head gap state as a result of the comparison; and storing an adjusted head gap state and waiting for printing (column 12, line 61-column 13, line 44)
- {claim 21} controlling a carrier driving unit to drive a carrier to be moved toward the head gap adjustment position along a carrier shaft (column 14, lines 12-36; carrier moved during printing operation); controlling a paper supply roller driving unit to generate a driving force when the carrier is disposed at the head

gap adjustment position in order for the carrier shaft to move with respect to a paper path (column 14, lines 12-36; occurs during printing operation)

- {claim 22} selectively transferring the driving force to the carrier shaft in response to the movements of the carrier; and terminating the transfer of the driving force to the carrier shaft in response to the movements of the carrier outside the head gap adjustment position from the head gap adjustment position (figure 6; column 8, lines 47-67)
- {claim 23} automatically adjusting the head gap in response to the driving force of the carrier driving unit and the paper supply roller driving unit without using an extra driving motor (column 8, lines 47-67)
- {claim 24} initializing the head gap (column 13, lines 5-44)
- {claim 25} storing an arbitrary head gap position in the non-volatile memory upon manufacturing of the printer; reading out the head gap state stored in the non-volatile memory; setting a head gap state flag corresponding to the read-out head gap state; and initializing a mechanism for the head gap (column 12, line 61-column 13, line 44)
- {claim 26} wherein the head gap adjustment command is received by one of a head gap adjustment and paper selection button on a control panel of the control unit (column 13, lines 26-27)
- {claim 27} An apparatus to adjust a head gap in an inkjet printer (abstract); a carrier provided with a printer head which includes nozzles to jet ink (figure 1, reference 40, 54, 56); a chassis provided with side frames to support a carrier

Art Unit: 2853

shaft and a guide rail to guide movements of the carrier (figure 1, reference 22); a carrier driving unit to move the carrier left and right along the carrier shaft (column 6, lines 5-22); a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on (figure 1, reference 26); wherein the head gap is adjusted by using driving forces of the carrier driving unit and the paper supply roller driving unit without using an additional driving unit (figure 1, 6; column 8, lines 47-67)



### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 11-13, 15, 19, 20-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olson (US Pat 5838338) in view of Kawahara (US Pat 4990004).

Olson discloses:

- {claim 1} An apparatus to adjust a head gap in an inkjet printer having a carrier provided with a printer head which includes nozzles to jet ink, a chassis provided

Art Unit: 2853

with side frames to support a carrier shaft and a guide rail to guide movements of the carrier, a carrier driving unit to move the carrier left and right along the carrier shaft, and a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on (figure 1, reference 40, 54, 56, 38, 22, 88; column 6, lines 5-46); a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier (figure 6; column 8, line 47-column 9, line 3); a control unit to store an adjusted head gap state and to adjust a head gap position required based on the stored adjusted head gap state (column 5, line 53-column 6, line 4; column 13, lines 6-44)

- {claim 2} a clutch part to transfer or cut off the driving force of the paper supply roller driving unit to or from the carrier shaft; and an operation part to operate the clutch part to transfer the driving force of the paper supply roller driving unit to the carrier shaft (figure 6; column 8, lines 47-column 9, line 3)
- {claim 13} a guide roller on the carrier to guide along the guide rail, so that the nozzles of the printer head mounted in the carrier are guided to horizontally ascend without being slanted forward or backward (figure 1, reference 40)
- {claim 15} a rotation shaft fixed to one of the side frames (figure 6, reference 72; column 7, lines 32-40); a first clutch gear having a toothed portion supported to rotate on the rotation shaft and meshed with the paper supply roller driving unit (figure 1, reference 98)
- {claim 28} An apparatus to adjust a head gap in an inkjet printer having a carrier provided with a printer head which includes nozzles to jet ink, a chassis provided

with side frames to support a carrier shaft and a guide rail to guide movements of the carrier, a carrier driving unit to move the carrier left and right along the carrier shaft, and a paper supply roller driving unit to drive a paper supply roller which supplies sheets of paper to be printed on (figure 1, reference 40, 54, 56, 38, 22, 88; column 6, lines 5-46); a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier (figure 6; column 8, line 47-column 9, line 3); a control unit to store an adjusted head gap state and to adjust a head gap position required based on the stored adjusted head gap state (column 5, line 53-column 6, line 4; column 13, lines 6-44); wherein the nonvolatile memory is used rather than an additional head gap sensor to adjust the head gap position (column 13, line 6-44)

Olson differs from the claimed invention in that it does not disclose:

- {claims 1 and 28} a carrier ascent/descent unit to rotate the carrier shaft with respect to the carrier to ascend and descend the carrier in order to adjust a head gap between the nozzles of the printer head and a respective sheet of paper; a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier ascent/descent unit by the carrier which moves by the carrier driving unit upon the adjustment of the head gap
- {claim 3} an eccentric rotation gear fixed to one end of the center shaft; and a clutch disposed on the chassis to connect or disconnect the paper supply roller driving unit and the eccentric rotation gear

Art Unit: 2853

- {claim 4} both ends of the carrier shaft which form eccentric cams having a center axis eccentric by a certain amount with respect to a center axis of the carrier shaft; and support bushings to support the both ends of the carrier shaft
- {claim 11} wherein the carrier shaft is rotated via the eccentric rotation gear, and at least one end of the both ends is fixed to the eccentric rotation gear
- {claim 12} wherein the both ends of the carrier shaft having the center axis eccentric with respect to a center axis of the carrier shaft, rotate in the support bushings via the clutch part and the eccentric rotation gear, allowing the carrier shaft to rotate about the center axis of the both ends
- {claim 15} a second clutch gear having a toothed portion supported to rotate on the rotation shaft and coaxially connected with the first clutch gear, the second clutch gear being disposed to move between a power transfer position at which the first clutch gear and the eccentric rotation gear are coupled and a power cutoff position at which the first clutch gear and the eccentric rotation gear are released; and an elastic spring supported by the rotation shaft via the first clutch gear, to elastically press the second clutch gear so that the second clutch gear is located at the power cutoff position
- {claim 19} wherein the carrier ascends and descends by a distance allowed for the center axis of the carrier shaft to vertically move

Kawahara et al discloses:

- {claims 1 and 28} a carrier ascent/descent unit to rotate the carrier shaft with respect to the carrier to ascend and descend the carrier in order to adjust a head



gap between the nozzles of the printer head and a respective sheet of paper (figure 1; abstract)

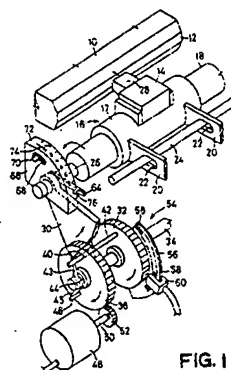


FIG. 1

- {claim 3} an eccentric rotation gear fixed to one end of the center shaft (figure 1, reference 26); and a clutch disposed on the chassis to connect or disconnect the paper supply roller driving unit and the eccentric rotation gear (column 5, lines 1-20)
- {claim 4} both ends of the carrier shaft which form eccentric cams having a center axis eccentric by a certain amount with respect to a center axis of the carrier shaft (figure 1, reference 26; column 8, lines 19-21); and support bushings to support the both ends of the carrier shaft (figure 1, reference 18; column 8, lines 19-21)
- {claim 11} wherein the carrier shaft is rotated via the eccentric rotation gear, and at least one end of the both ends is fixed to the eccentric rotation gear (figure 1, reference 26)
- {claim 12} wherein the both ends of the carrier shaft having the center axis eccentric with respect to a center axis of the carrier shaft, rotate in the support

Art Unit: 2853

bushings via the clutch part and the eccentric rotation gear, allowing the carrier shaft to rotate about the center axis of the both ends (figure 1, reference 18, 26)

- {claim 15} a second clutch gear having a toothed portion supported to rotate on the rotation shaft and coaxially connected with the first clutch gear, the second clutch gear being disposed to move between a power transfer position at which the first clutch gear and the eccentric rotation gear are coupled and a power cutoff position at which the first clutch gear and the eccentric rotation gear are released (figure 7, reference 36; column 8, line 43-column 9, line 36); and an elastic spring supported by the rotation shaft via the first clutch gear, to elastically press the second clutch gear so that the second clutch gear is located at the power cutoff position (figure 7, reference 44)
- {claim 19} wherein the carrier ascends and descends by a distance allowed for the center axis of the carrier shaft to vertically move (figure 1; orient figure 90 degrees to see vertical movement)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kawahara et al into the invention of Olson. The motivation for the skilled artisan in doing so is to gain the benefit of being able to control the moving distance of the print head to the sheet through controlled movement of the printhead. The combination naturally suggests a clutch unit to transfer a driving force of the paper supply roller driving unit to the carrier ascent/descent unit by the carrier which moves by the carrier driving unit upon the adjustment of the head gap.

*Allowable Subject Matter*

Claims 5-10, 14, and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 discloses “an elastic spring supported by the rotation shaft **between** (emphasis mine) the first clutch gear and the second clutch gear, to elastically press the second clutch gear so that the second clutch gear is located at the power cutoff position,” which was not found, taught, or disclosed in the prior arts.

Claims 6-10, 14, and 16-18 depend from objected claim 5.

*Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mimura et al (US Pat 4917512) discloses an apparatus for automatically adjusting a gap between a platen and a print head.

Niikawa (US Pat 4927277) discloses a printer having a device for adjusting the printing condition, depending upon paper thickness.

Hino (US Pat 5678936) discloses a printer with head gap adjusting mechanism.

Rasmussen et al (US Pat 4843338) discloses an ink-set printhead-to-paper referencing system.

Honda et al (US Pat 5051008) discloses an automatic gap adjusting mechanism.

Takei (JP Pat 04161369 A) discloses a head gap adjusting device for dot printer.

Art Unit: 2853

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lsl LSL  
03/18/05



**MANISH S. SHAH**  
**PRIMARY EXAMINER**